

**Herpetofaunal Surveys of National Park Service Sites in Western Nebraska, Eastern Wyoming, Western South Dakota, and Western North Dakota:**

**Interim Report, 2002 Field Work**

**Brian E. Smith**

**Department of Biology**

**Black Hills State University**

**1200 University Street Unit 9044**

**Spearfish, SD 57799-9044**

**E-mail: [briansmith@bhsu.edu](mailto:briansmith@bhsu.edu)**

**Abstract:** During spring and summer of 2002, surveys of seven national park units were conducted in western Nebraska, eastern Wyoming, western South Dakota, and western North Dakota. The objectives were to assess various survey techniques used in the area, including visual encounter surveys, nighttime call surveys, night driving and trail searches, and nighttime searches of prairie dog burrows. Drift fences were not used. The most successful techniques were nighttime call surveys and nighttime searches of prairie dog burrows, but both survey types are biased towards the observation of only one or a few species of amphibians. Visual encounter surveys were the only other survey type that was successful in finding other species, but in general the success rate of this survey type was very low (but higher when conducted in suitable habitat than if they were conducted at random localities). Few expected species have been encountered on each park unit. Possible reasons for this included the lack of use of some survey types, especially drift fences, severe drought affecting the area in 2002, and lack of time and

resources. It is also possible that the numbers of species of herpetofauna expected on each park will decline when detailed reports are compiled in which habitat is taken into consideration. Suitable habitat for several species does not exist on many of the park units under investigation, although these species are listed as occurring on the park unit since the unit is within the range of the species.

### **Introduction**

The herpetofauna of Wyoming, Nebraska, South Dakota, and North Dakota is poorly known. The last comprehensive summary of the herpetofauna of Wyoming was completed by Baxter and Stone (1985). The herpetofauna of Nebraska was last catalogued by Lynch (1985); that of South Dakota was catalogued by Ballinger et al. (2000), but no new surveys were completed. Smith et al. (1998a, b) surveyed the herpetofauna of Wind Cave and Badlands National Parks, but these reports were not published. Wheeler and Wheeler (1966) last summarized the herpetofauna of North Dakota.

During the summer of 2002, I began surveys of seven national park units including Scotts Bluff National Monument outside of Scotts Bluff, Nebraska; Fort Laramie National Historical Site near Fort Laramie, Wyoming; Jewel Cave National Monument, Devil's Tower National Monument, and Mount Rushmore National Memorial in the Black Hills of South Dakota and Wyoming; and Fort Union and Knife River Indian Villages National Historical Sites in western North Dakota. My objectives were to observe at least 90% of the species expected on each park unit and to comment on the effectiveness of survey techniques used on each park.

### **Methods**

Several methods were used on each park, including visual encounter surveys (Crump and Scott, 1994), nighttime call surveys (Mossman et al., 1998), and night driving (Shaffer and

Juterbock, 1994). Other techniques were specially designed for this study, including night walking and nighttime prairie dog town surveys (Kolbe et al., 2002). Because the objective of the study was to observe species expected on each park unit, techniques used to identify specific species, such as nighttime prairie dog surveys, were discontinued on each park unit after target species were observed. Also, surveys were not randomly conducted, again because the surveys were designed to observe specific target species. Likely habitat was searched for all types of herpetofauna expected on each park unit. The field work during 2002 was seriously compromised by extreme drought conditions that existed throughout the area; most wetland sites on the park units never filled with water and amphibians were probably underrepresented in the samples.

*Visual encounter surveys:* Visual encounter surveys were completed for two person-hours per site in suitable habitat on all park units, during the day and during suitable weather conditions (temperature > 16°C, wind calm). No effort was made to determine the amount of area searched, since this varied widely due to habitat, searching technique, target species, and observer effort. Several surveys were abandoned at Scotts Bluff National Monument and Fort Laramie National Historical Site due to high winds.

*Nighttime call surveys:* Nighttime call surveys were completed at several wetland sites of many different sizes, including riverine sites, at all park units. However, most wetlands never filled with water, and typically the field crews conducted surveys at dry sites that would be wetlands during wet years. At times, the field crews chose random areas along roads to conduct surveys, especially along irrigation canals and rivers, because of the extreme drought. Surveys were completed for 15 minutes three times apiece at each site across all parks and calling amphibians were recorded.

*Night driving and night walking:* Because most of the park units were so small, night driving could not be usefully conducted at most sites. However, entrance roads were searched at night during nighttime call survey work, and trails were walked by crews using flashlights to search for herpetofauna at night. Search time was highly variable, and it is not possible to judge how much habitat is surveyed using these types of surveys, since it is not known how much habitat is effectively searched by cars or workers driving or walking trails at night. Because the roads and trails were frequently little more than access roads or short walking loops, we did not estimate the road or trail mileage searched.

*Nighttime prairie dog town surveys:* Kolbe et al. (2002) discovered that it was possible to search prairie dog towns and successfully observe tiger salamanders (*Ambystoma tigrinum*) at night by shining flashlights into prairie dog burrows. On average, about two salamanders are discovered per 100 burrows searched, making the technique very effective in searching for these highly cryptic burrowing salamanders (Kolbe et al., 2002). Field crews searched prairie dog towns on park units until at least one tiger salamander was discovered, at which time this survey type was discontinued on each park. On parks without prairie dog towns, small mammal burrows and other types of burrows were searched for tiger salamanders at night.

## **Results**

Species collected and expected on each park unit are listed in Tables 1 and 2. Species expected on each park were largely determined from range maps published in Conant and Collins (1991).

It is difficult to compare each survey type, since each type is designed to uncover certain target species that may be rare or common. A total of 206 hours of visual encounter surveys were conducted on all parks combined. On these surveys, 29 specimens were collected, a

success rate of 0.141 specimen/hour, somewhat more successful than that reported by Smith et al. (1998a) at Wind Cave National Park. The Wind Cave National Park surveys were conducted at random sites, whereas surveys in the present study were conducted in suitable habitat, which may account for the higher success rate in the present study. Twelve prairie dog town surveys were conducted, with four *Ambystoma tigrinum* found on three separate surveys. Hundreds of burrows were checked, but it is probably more accurate to define the “success rate” as the number of surveys during which salamanders were found; in this case, 25% of the surveys were successful. Nighttime calling surveys were highly successful in finding anurans. A total of 163 call surveys were conducted, or 40.75 hours of surveys. Choruses were found during 78 of these surveys, for a success rate of 47.9%. However, anurans were not equally likely to be found during these surveys. Primarily *Pseudacris triseriata* and *Bufo woodhousei* were found on nighttime calling surveys, along with an occasional chorus of *Rana pipiens*. Various other anurans expected on the park units, such as *B. cognatus* and *Scaphiopus bombifrons*, were not found during these surveys.

### Discussion

In general, the first season of work showed that it is difficult to judge whether the first objective of the study, the survey of at least 90% of the herpetofauna on each park unit, is being met. According to Table 1, 43.8% of the species expected on Devil’s Tower National Monument were observed; for Fort Laramie National Historical Site, 50.0% of the expected species were observed; for Fort Union National Historical Site, 27.2% of the expected species were observed; for Jewel Cave National Monument, 27.2% of the expected species were observed; at Knife River Indian Villages National Historical Site, the investigators found 23.1% of the expected species; at Mount Rushmore National Memorial, 27.2% of the expected species were observed;

and at Scotts Bluff National Monument, the investigators found 38.1% of the expected species. However, these raw data are misleading. Because most of the park units in this study are so small, suitable habitat does not exist for several species, although the park may be within the range of several species. This is common for species that require fairly large bodies of ponded water, such as *Chrysemys picta*, and is probably true for other species as well. Also, rare species, such as most snakes, were difficult to find because field time is limited. In addition, because funding was limited, it was not possible to employ drift fences, which have been shown to be the most effective means of sampling several herpetofauna, especially snakes (Brenner et al., 1992). Another season of field work will obviously help to further fill in species lists for each park unit, but it is highly likely that lack of resources will leave the study short of its goal. The lack of habitat for some species on each park unit will be addressed in detailed reports for each park, and it is likely that Tables 1 and 2 will be further refined in these reports. This could lead to considerable revision of the results vis-à-vis observation of expected herpetofauna.

A few comments can be made about survey techniques. In the absence of drift fences, the visual encounter survey is the only survey type that can be used to find various rare herpetofauna, especially snakes, but also other herpetofauna that may have specific habitat requirements. Nighttime call surveys, while they have been highly successful in recording calling choruses of anurans, generally record the same species every time. Most such surveys have located one species, *Pseudacris triseriata*, with *Bufo woodhousei* commonly recorded in suitable habitat (along rivers and smaller streams). *Rana pipiens* were also occasionally recorded. Other species of interest, such as *B. cognatus* and *Spea bombifrons*, are explosive breeding anurans that may breed only a few nights a year (Conant and Collins, 1991). For these anurans, investigators must be in the right place at the right time; typically small ponds along

roadsides or on the prairie during heavy spring rains (Smith et al., 1998a). These environmental conditions did not occur during 2002. Also, due to the spread-out nature of the study region, it is difficult to reach any of the park units if rains occur in the area, unless investigators happen to be on a site when rains occur (most of the park units in this study are several hours from each other). Night driving and night walking have not been successful, possibly because few roads or trails exist on these parks. Investigators have observed roads and trails carefully as they have entered and left park units, but only a few kms of roads or trails exist on each unit, and no specimens were found using this survey type. Surveys of prairie dog towns are highly directed searches used to discover *Ambystoma tigrinum*, although they may find other herpetofauna, such as *B. woodhousei* or *Crotalus viridis*. Since they take little time to conduct, and are usually successful within a short time in finding the relatively cryptic *A. tigrinum*, they are a worthwhile addition to any general herpetofaunal study in the Great Plains region.

Finally, this interim report would not be complete without mentioning general weather conditions during 2002. The region of the study is subject to periodic drought, and during 2002 experienced severe drought. Most wetlands did not fill with water during the survey period. Although surveys of wetlands were conducted, such as visual encounter surveys and nighttime calling surveys, since the wetlands did not hold water I can only assume that these surveys were highly ineffective in 2002. High winds also plagued the area, and several surveys were conducted at Fort Laramie National Historical Site and Scotts Bluff National Monument during wind conditions that are typically not suitable for herpetofaunal activity. Winds over 100 km/hr were common during some spring field trips to these sites.

In summary, the surveys have been reasonably successful given the weather conditions of 2002, and I believe that we discovered a reasonable number of species expected at the sites.

However, lack of resources (especially drift fences) will continue to hamper the study. In addition, the fall of 2002 was extraordinarily dry. If drought conditions are unalleviated into 2003, it might be worthwhile to postpone future surveys until weather conditions improve.

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Park Unit	Amti		Buco		Buwo		Pstr		Raca		Rapi		Spbo		Apsp		Chpi		Chse		Cnse		Eumu		Homa		Phdo		Scgr		Scun	
	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O
DETO	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	Y	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N
FOLA	Y	N	?	N	Y	Y	Y	Y	?	N	Y	Y	Y	N	?	N	Y	N	Y	Y	N	N	N	N	?	N	Y	N	?	N	?	N
FOUS	Y	N	?	N	?	N	Y	Y	N	N	Y	Y	Y	N	?	N	Y	N	Y	N	N	N	N	N	N	N	?	N	?	N	N	N
JECA	Y	Y	N	N	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	Y	N	Y	N	N	N	N	N	N	N	?	N	N	N	N	N
KNRI	Y	N	Y	N	Y	Y	Y	Y	N	N	Y	N	Y	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
MORU	Y	N	N	N	Y	N	Y	Y	N	N	Y	Y	Y	N	N	N	Y	N	Y	N	N	N	N	N	N	N	?	N	N	N	N	N
SCBL	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	?	N	?	N

Table 1. Amphibians, turtles, and lizards expected (E) or observed (O) on the park units studied in this report. Abbreviations: Y

= yes; N = no; ? = insufficient data. DETO = Devil's Tower National Monument. FOLA = Fort Laramie National Historical Site.

FOUS = Fort Union National Historical Site. JECA = Jewel Cave National Monument. KNRI = Knife River National Historical Site.

MORU = Mount Rushmore National Memorial. SCBL = Scott's Bluff National Monument. Amti = *Ambystoma tigrinum*; Buco =

*Bufo cognatus*; Buwo = *Bufo woodhousei*; Pstr = *Pseudacris triseriata*; Raca = *Rana catesbeiana*; Rapi = *Rana pipiens*; Spbo = *Spea*

*bombifrons*; Apsp = *Apalone spinifera*; Chpi = *Chrysemys picta*; Chse = *Chelydra serpentina*; Cnse = *Cnemidophorus sexlineatus*;

Eumu = *Eumeces multivirgatus*; Homa = *Holbrookia maculata*; Phdo = *Phrynosoma*; Scgr = *Sceloporus graciosus*; Scun = *Sceloporus undulata*.

Park Unit	Coco		Crvi		Hena		Latr		Opve		Pica		Stoc		Thel		Thra		Thsi	
	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O
DETO	Y	Y	Y	N	Y	N	Y	N	N	N	Y	Y	N	N	?	N	?	N	Y	Y
FOLA	Y	Y	Y	Y	Y	N	Y	N	N	N	Y	N	N	N	N	N	?	N	Y	Y
FOUS	Y	N	N	N	Y	N	N	N	?	N	Y	N	N	N	N	N	Y	Y	Y	N
JECA	?	N	N	N	N	N	Y	N	?	N	Y	N	?	N	Y	N	N	N	Y	N
KNRI	Y	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	Y	Y	N
MORU	?	N	N	N	N	N	Y	N	?	N	Y	N	?	N	Y	Y	N	N	Y	N
SCBL	Y	Y	Y	Y	Y	N	Y	N	N	N	Y	Y	N	N	N	N	Y	N	Y	N

Table 2. Snakes expected (E) or observed (O) on the park units studied in this report.

Abbreviations are as used in Table 1. Species: Coco = *Coluber constrictor*; Crvi = *Crotalus viridis*; Hena = *Heterodon nasicus*; Latr = *Lampropeltis triangulum*; Opve = *Opheodrys vernalis*; Pica = *Pituophis catenifer*; Stoc = *Storeria occipitomaculata*; Thel = *Thamnophis elegans*; Thra = *T. radix*; Thsi = *T. sirtalis*.